CLAIMS

1. Method for controlling the pressure in at least one inflatable cuff, preferably a finger cuff, of a blood pressure measuring apparatus with a plethysmographic sensoring device, whereby a plethysmographic signal PG and a cuff pressure signal BP are obtained, **characterized in that**

   a) in a first, inner control loop the cuff pressure signal BP is used as control variable and is fed into a difference amplifier as a first input signal,

   b) in a second, outer control loop the plethysmographic signal PG, with its mean value $\overline{PG}$ suppressed, is fed into a controller, preferably a PID-controller, and is added to a set-point signal SP, and a target signal SW is generated, which is fed into said difference amplifier as a second input signal, and

   c) the output signal AS of the difference amplifier is used to control at least one valve connected to a pressure source, i.e. preferably a proportional valve, which in turn regulates the pressure in the cuff.

2. Method according to claim 1, **characterized in that** the mean value $\overline{PG}$ of the plethysmographic signal PG is determined in third control loop and continuously corrected as input signal of the second control loop.

3. Method according to claim 1 or 2, **characterized in that** the amplification parameters P, I and/or D are optimised in a fourth control loop by means of the plethysmographic

signal PG and the cuff pressure signal BP, and are continuously corrected as inputs to the PID-controller.

4. Method according to any of claims 1 to 3, **characterized in that** in a fifth control loop the set-point signal SP is readjusted, depending on the integral of the plethysmographic signal PG.

5. Method according to any of claims 1 to 4, **characterized in that** in a sixth control loop the set-point signal SP is readjusted on the basis of derived quantities, such as amplitude, mean value, wave form etc., of the plethysmographic signal PG and the cuff pressure signal BP, using a fuzzy-logic-approach.

6. Method according to any of claims 1 to 5, **characterized in that** in a seventh control loop the set-point signal SP is readjusted in dependence of the pulse waveform of the cuff pressure signal BP.

7. Method according to any of claims 1 to 6, **characterized in that** in an eighth control loop the set-point signal SP is readjusted by means of neural networks, autoregressive models or self-learning models.

8. Method according to any of claims 1 to 7, **characterized in that** the cuff pressure signal BP is fed to a systole/diastole detector whose output signal is used as control variable in at least one of control loops three to eight.

9. A device for controlling the pressure in at least one inflatable cuff, preferably a finger cuff (6), of a blood pressure measuring apparatus, which has a plethysmographic sensor device (8, 9) for obtaining a plethysmo-

graphic signal PG and a pressure sensor (7) for obtaining a cuff pressure signal BP, **characterized in that** two control loops (1, 2) acting on a difference amplifier (10) are provided, where the first, inner control loop (1) uses the cuff pressure signal BP as a first control variable and where the second, outer control loop (2) is provided with a controller (12), preferably a PID-controller, which generates a target variable SW from the plethysmographic signal PG as a second control variable, and where the output of the difference amplifier (10) controls at least one valve connected to a pressure source (4), i.e. preferably a proportional valve (3; 25, 27), thereby regulating the pressure in the cuff (6).

10. Device according to claim 9, **characterized in that** the second control loop (2) is provided with a difference amplifier (11), which subtracts the plethysmographic signal PG from its mean value $\overline{\mathbf{PG}}$, and with a summation unit (13) adding a set-point signal SP.

11. Device according to claim 9 or 10, **characterized in that** said difference amplifier (10) controls an inlet valve (25) connected to a pressure source (4) via a non-inverting amplifier unit (23) and an outlet valve (27) via an inverting amplifier unit (24), said valves preferably being designed as proportional valves which are pressure-connected to the inflatable cuff (6).

12. Device according to any of claims 9 to 11, **characterized in that** said difference amplifier (10) is designed as a comparator which actuates at least one digital switching valve for pressure regulation in the cuff (6).

13. Device according to any of claims 9 to 12, **characterized in that** the plethysmographic sensor (8, 9) is furnished with a device (28, 40, 41) for the elimination of stray light, in particular ambient light, from the plethysmographic signal PG.

14. Device according to any of claims 9 to 13, **characterized in that** the light source (8) of the plethysmographic sensor (8, 9) is furnished with circuitry (33 to 38) for controlling its voltage or current.

15. Device according to any of claims 10 to 14, **characterized in that** a device (42 to 47) is provided for computing an initial value for the mean value $\overline{PG}$ of the plethysmographic signal.

16. Device according to any of claims 10 to 15, **characterized in that** a device is provided for computing an initial value for the set-point signal SP.